

JOURNAL
· OF THE
BOMBAY NATURAL
HISTORY SOCIETY

1975 AUGUST

Vol. 72

No. 2

Keibul Lamjao Sanctuary and the
Browantlered Deer—1972 with
notes on a visit in 1975

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(With two plates)

There has been no investigation done of the status of this animal and its unique habitat since E. P. Gee's report of November, 1959 and March, 1960, in this *Journal* (1960). But it is certain that the Manipur stag (*Cervus eldi eldi* McClelland, 1842 is today one of the rarest and the most localised subspecies of the family Cervidae in the world. Zealously protected by the former rulers of Manipur State in the past, the stag was relentlessly hunted by both local people and army personnel once the area came under British hegemony. By 1950 the Manipur subspecies of the browantlered deer was regarded as extinct till located once again in a small area called the Keibul Lamjao at the south-eastern corner of the Logtak Lake. An area of approximately 20 sq miles was formed into a sanctuary in 1954, and was subsequently reduced to 10 $\frac{3}{4}$ sq miles in 1959. The other subspecies of the browantlered deer or Thamin in the Burmese subspecies (*Cervus eldi siamensis* Lydekker, 1915), the Manipur variety, locally called the *sangai* or occasionally

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sangrai, carries the smallest pair of antlers and has always been confined, even in historical times, to the vale of Manipur. At present, it is restricted to the Keibul Lamjao.

About 20 miles south of Imphal, the Capital of Manipur, lies the Logtak Lake, approximately 25 sq miles in extent, and famous for its fish and migratory waterfowl. There are floating islands or "Phumdi" on the lake, on which live fishermen in temporary huts. It is one of the largest natural lakes in the country, and forms a vast inland drainage area. South of the Logtak Lake and separated from it by the Thanga Hills, lies another low lying swamp called the Keibul Lamjao. Its eastern boundary is the Manipur river which drains the Logtak and indeed the entire vale of Manipur, ultimately joining the Chindwin river in Burma.

To the east of the Manipur river, is another marshy area called the Khoidum Lamjao,—rather larger than Keibul, which had its own population of the deer. This area is now reclaimed and cultivated, and the Sangai have been destroyed, a few of them crossing over into the Keibul sanctuary. To the west of the sanctuary and below the western hills of the Manipur valley was another Sangai area centring around a village called Sangailou (the Sangai paddy fields). Now this region also has been cultivated. In effect, therefore, the Sangai has been now restricted completely to the Keibul Lamjao Sanctuary and even here its habitat has shrunk.

Between 1959 to 1968 the area of the sanctuary was $10\frac{3}{4}$ sq miles. In 1968 a further 3 sq miles of the area north of the Khordak River, which drains the northern portion of the sanctuary, was added to the sanctuary, increasing the total area to $13\frac{3}{4}$ sq miles.

There are three hill features in the sanctuary. The northernmost is the Chingjao Hill, the Pabot Hill with the observation shed being a little to the south of this; and the third, Toya Hill, approximately 3 miles further to the south. There was much more vegetation on the Pabot Hill which I visited, than is shown in the photograph accompanying EPG's report of 1960. This proves that this area at least has been better protected since then. However, there is considerable grazing on Chingjao Hill which has practically no trees left. In fact, the entire portion of the sanctuary a quarter mile from the north-west of Pabot Hill is grazed intermittently, and there is cultivation and habitation on the Khordak River which bisects the northern portion of the sanctuary. These cultivations are illegal. Further to the south, there is a sickle shaped tongue of lowland called Thang-Brel-Maril which practically cuts the entire sanctuary into half. This is a strip about 300 to 500 yards wide, and though there are only about 4 or 5 official patta holders at the western corner of it, illegal encroachments continue to delve deeper and deeper along this strip of land. Though the area has been demarcated and there are boundary pillars, encroachment continues to

spill over these lines. Mostly paddy is grown, and from here cattle sally forth and disturb adjacent regions. South of the Toya Hill and along the Khuga River north of Ithai village, there is more grazing by a substantial number of cattle, and the area is fast degenerating. The effective habitat of the Manipur deer is now confined to an area east and south of the Pabot Hill up to the Thang-Brel-Maril, and another area further south of this strip of cultivation extending up to Toya Hill.

Thus though the total area of the Keibul Lamjao Sanctuary is $13\frac{3}{4}$ sq miles, the real habitat of the Manipur deer does not exceed 6 sq miles, and this too is under imminent danger of being divided into two halves. The total world population of the subspecies is now confined to this last tenuous habitat, and at the rate at which encroachment and grazing is increasing, if no urgent steps are taken to reverse this process and to safeguard the sanctuary, the Sangai will be extinct very soon. It is evident that the prime reason for the survival of this unique deer in this heavily populated area is the floating swamp. If the swamp (or phumdi) goes, the deer will vanish with it.

STATUS OF THE SANCTUARY

The Keibul Lamjao Sanctuary is a protected forest today. There is not even a proposal to make it into a reserve forest for the time being. In my opinion this should be done forthwith as it will give the Forest Department the right of removal of any encroachers. The sanctuary has been notified in the gazette in 1966 and its boundaries have been outlined. It is under the Eastern Forest Division of Manipur, with range headquarters at Moirang.

Climate:

The average annual rainfall is approximately 125 cm. The humidity is highest in the month of August at 81 per cent and lowest in March at 49 per cent. The maximum temperature is 35°C and the minimum 1.66°C. Frost occurs during the winter.

Flora:

Apart from the three hills of Pabot, Toya and Chingjao, the remainder of the sanctuary is one vast morass of floating organic matter called the phum or phumdi. A passage of free water for boating up to Pabot Hill, has been cleared. The phumdi is made up of decayed vegetation, and varies in thickness from 1 to 4 feet. It floats upon the water, whose level varies with the season. Thus during the driest months of February and March, some of the phumdi especially along the edge of the sanctuary, rests on the hard ground below. Actually only 1/5th of the phumdi shows above water, the rest being below it. The floating islands are a

growing organic unit and the thickness of the phumdi increases from year to year. This is particularly applicable to the phumdi which during the summer season rests upon the ground. With onset of the monsoon, the major portion of the sanctuary gets covered with water and the animals seek refuge on the hills. Then in approximately three or four days the phumdi which had settled on the ground, sets itself free and once again floats on the top of the water. In 1966, there were heavy floods with the water level rising to an unprecedented height of 2531 feet above msl. The phumdi got carried away with the current and with it went a certain number of the deer.

Walking on the phumdi is a unique experience—as if one was walking on an air-mattress. Where the phumdi is not thick enough to support the weight, one can sink up to one's thigh in the ooze—and this happens every few steps.

The reeds and grasses which grow on the phumdi, and the ratio thereof, are listed in E. P. Gee's account. Since I myself did not carry out a detailed investigation in this regard, Mr. Gee's list is reproduced below:-

“Tou	<i>Phragmites karka</i>	45% of the sanctuary
Singut	(not yet identified)	25%
Khoimum	<i>Saccharum munja</i>	15%
Ishing Kombong	<i>Saccharum latifolium</i>	5%
Pulai	<i>Alpinia allughas</i>	5%
Singnang	<i>Saccharum procerum</i>	2%
Miscellaneous		3%”

The Ishing Kombong (*Saccharum latifolium*) is the favourite food of the Sangai and is relished even by the hind which was in captivity at the Keibul chowki. Secondly, the percentage which it occupied in the sanctuary, if not 5 per cent as E. P. Gee's reports, would certainly not be more than 10 per cent. An adequate supply of the Ishing Kombong grass is essential for the conservation of the deer and the matter becomes more significant when it is realised that it is also a favoured food of the encroaching domestic buffalo.

As has been mentioned above, the phumdi becomes thicker and heavier with the passage of time with more vegetation being added to it each year. This process of annual increase is more evident in the phumdi at the edges of the sanctuary, where it has the opportunity of settling on the ground for the longest period and thereby derives sustenance from the soil below. If for two to three years consecutively, there is no heavy flooding, this bordering phumdi would not be forced to leave the ground to float. It will become a part of the hard ground as humus. The factor of trampling by domestic buffalo during the dry season would also, I am sure, help in pressing the phumdi to the hard

ground below and making it a permanent fixture thereupon. The ultimate result of such a process is that the phumdi at the border becomes hard ground with the passage of time, and the actual area of the floating phumdi decreases. It is this process which decreases the floating phumdi habitat of the sangai in the Keibul Lamjao. Water Hyacinth has made its appearance in the open water areas of the sanctuary, but this being very limited it has not yet reached significant proportions in the sanctuary. The three hills within the sanctuary are not only very important observation points in the sanctuary, but constitute a very significant factor in the eco-system. They are the only hard ground in the sanctuary to which the animals can repair to from time to time. Though the sangai has adapted itself admirably to the phumdi habitat, the alacrity with which the captive sangai move over hard areas and hilly ground and the fact that it used to inhabit other non-phumdi areas is evidence enough that unlike the *sititunga*, the sangai is not exclusively a marsh animal. The fact that they regularly visit the hills is proved by their droppings there. Other animals such as the hog deer also use these hills, which during the floods provide the only refuge for the larger mammals of the sanctuary. All the three hills should be strictly protected from grazing and other exploitation and trees and shrubs should be allowed to grow there. Simul and other indigenous trees like *Salix tetrasperma* may be planted, especially on the now barren Chingjao Hill, but no exotic should be introduced.

Exploitation:

The right of grass cutting is auctioned each year in the months of March and April for approximately Rs. 2,000/-. The singang grass is utilised for thatch purposes. Burning occurs during the dry season and is reported to be accidental. However, it is possible that some of these fires, at least on the periphery are caused by graziers to obtain fresh grass.

Grazing:

It is most prevalent in the northern and southern part of the sanctuary and around Keibul village has succeeded in degenerating these lands. Only buffaloes are able to traverse the marsh though a few cows were seen grazing along the periphery. Some buffaloes were observed in the centre of the sanctuary just south of the Pabot Hill in the best sangai area. Though no cutting of trees was noticed, the fact that Chingjao Hill has no trees and that Toya Hill also has rather sparse vegetation, is an indication that there is grazing and cutting on these two hills.

I was informed that approximately 100 people cut grass in the sanctuary every day. Certain plants are collected for consumption as vegetables. Fishing in the open patches is also indulged in, and I saw a number of fish traps along the channel leading to Pabot Hill. Apart from

the grass cutters, fishermen and the graziers, some people pass through the sanctuary on their way to Khordak and the Logtak for purposes of fishing.

Poaching does occur in the sanctuary, especially in the northeastern region. The poachers use shot guns and drive the deer with dogs. A wooden trap which resembles a yoke is also used. The main offenders are from the Muslim community whose population around the sanctuary has increased. To a certain extent poachings is also done by the tribes such as the Kukis who live to the south of the sanctuary. Luckily the Hindu population is mostly vegetarian. However, the Muslim community possess a large number of weapons, and the crop-protection weapons are issued to the land-owners including those occupying land in the Thang-Brel-Maril. Poaching and habitat destruction are the two significant causes for the present precarious status of the sangai. Most of the poaching occurs from March to May during the dry season.

The remains of a young hog deer was found on Pabot Hill, but its cause of death could not be ascertained. A hog deer stag was reported to have been killed by poachers in north-west part of the sanctuary a few days before our arrival.

Fauna:

The browantlered deer:

E. P. Gee had carried out a sample survey of an area of a quarter sq. mile, and from the deer counted in this patch, he had estimated that the total population was 100. I was only able to see one stag from Pabot Hill and was told that I was lucky. A drive was attempted in a small patch at the southwestern corner of the sanctuary close to Thang-Brel-Maril. No deer was put up. Despite the fact that some of the deer which must have then lived in Khoidum-Lamjao across the Manipur river, and which subsequently must have crossed to Keibul Lamjao following the opening of that area for cultivation, the number of sangai today is less than that when E. P. Gee visited in 1960. This was confirmed by Babu Singh the most knowledgeable amongst the staff of the sanctuary. The reason is primarily poaching, and secondly the further shrinking of the habitat due to grazing, cultivation and grass cutting. The floods of 1966 in which the phumdi was swept away from certain areas, must have also contributed to the decimation. The total area which would now be fit for sangai habitation would only be about 6 sq. miles as has been mentioned above, and unless the process reverses, it will shrink still further. The largest number of sangai reported to have been seen together recently is five and the usual number are ones and twos. Though it is not possible to assess correctly the total population in such a habitat, I would certainly put the figure as less than 100. More in the neighbourhood of 50. It is imperative that a census of this animal be carried

out, and the only way it can be done is from a helicopter flying low over the morass.

Hog-deer (*Axis porcinus*) occur in the sanctuary and their droppings were observed on Pabot Hill. Wild pig also exist and raid the surrounding crops. Their droppings were seen. A wild cat locally called "Sadung" was reported in the sanctuary. From its description it appears to be a civet of an indeterminate variety.

Staff:

The sanctuary is under one deputy ranger, three forest guards, one game chaprasi and one boatman, and two daily-wage employees working as boatmen. This very small staff is stationed at three points Keibul to the west, Ithai to the south and Paphu-pat in the east. They have residential accommodation. The staff is wholly inadequate and would have to be greatly augmented.

Residential Accommodation and facilities for Tourists:

There are two rest houses—one at Phubala off the Imphal-Moirang road. It is situated close to the Logtak lake and has 4 rooms with two beds each, quite well furnished. It is under the control of the Publicity Department and the charges are Rs. 3/- per day. There is no catering arrangement. The rest house is electrified but there is no running water. It is a beautifully situated bungalow and could be developed. There is another rest house at Sendra on the Thanga Hills that commands a magnificent view of Logtak Lake as well as the southern aspect of the valley. This also has 4 suites, but was under repairs. There are no vehicles for tourists to hire. The only method whereby tourists can visit the sanctuary is to go up to Keibul by road and then along the water channel in dug-out boats upto Pabot Hill, where there is an observation shed. (Plate I). Usually, mornings and evenings are preferred and if the visitor is lucky he may see from the hill top the deer moving about on the phumdi. The view from here is magnificent but the chance of seeing deer are remote. If driven out by beaters, deer can be seen from the hill tops, but walking on phumdi is very difficult and the villagers are not keen to undertake the job. Besides, such regular drives would be a great factor of disturbance to the deer and should not be normally practised.

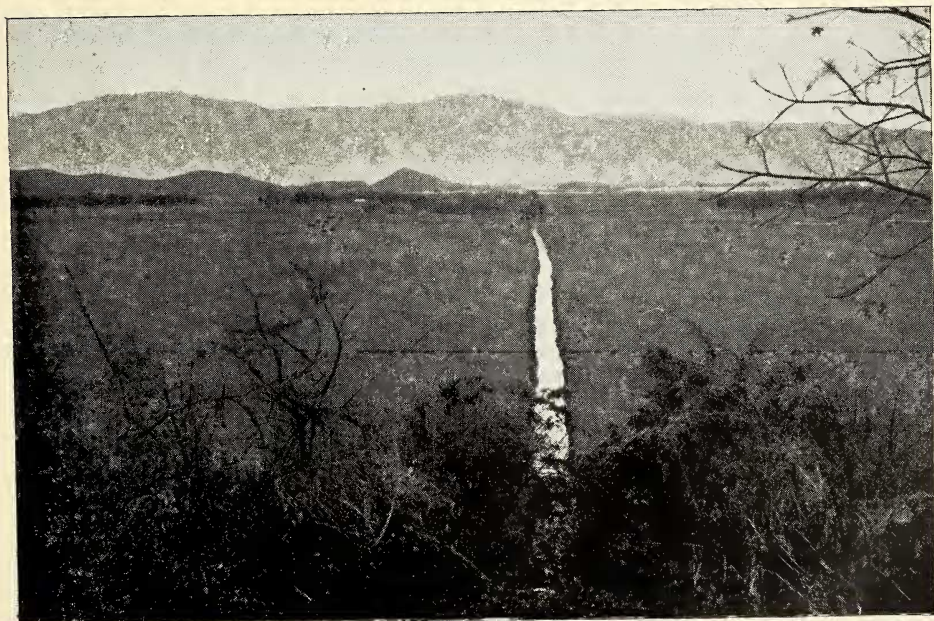
The Logtak project:

A coffer dam is being put up below the junction of the Khuga and Manipur rivers, south of Ithai village and approximately half a mile below the southern tip of the sanctuary. The gate of the Ithai dam will be 2525 feet above main sea level. This will therefore, be the height of the water in the Logtak Lake; and since the Logtak is connected with the Keibul Lamjao through two channels running through the Thanga Hills, the water table of the Keibul Lamjao will also be 2525 feet above msl. The surplus water of the Logtak which would have otherwise

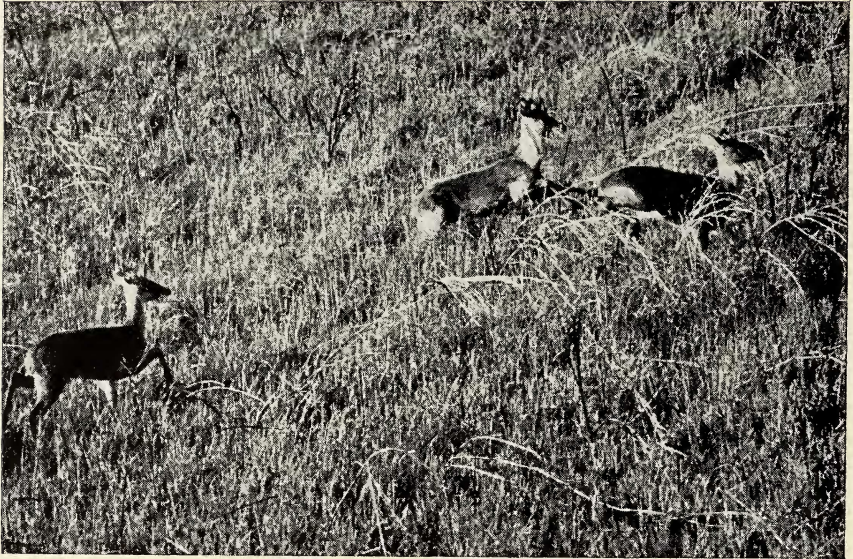
spilt over the dam at Ithai, would be diverted through a channel running west-ward from the Logtak. This water will then go through a tunnel in the western range of hills, and a drop of thousand feet, will generate 35 Kw of power.

The height of the water in the Logtak Lake and in the Keibul Lamjao varies from 2518 to 2528 feet above msl. The lowest level is in February-March, the highest of course being during the monsoon. In 1966 the water level of the flood waters rose to 2531 feet above msl as a result of which some phumdi is reported to have been swept away. Now the water level is sought to be retained at 2525 feet constantly. The danger of a flood has been averted as the river is being widened. In the dry season the water level of the Logtak and the Keibul sanctuary would not also go down to 2518.

At the height of 2525 feet above msl, the area under water in the Keibul sanctuary will increase. Since the level is going to be retained at that height, the extent of the phumdi habitat would also theoretically remain constant. The phumdi will not settle on the ground in the dry season and the predilection for becoming heavier and heavier and finally settling on the hard ground would be lessened. The cattle and the poachers will not be able to make their inroads during the dry season to the extent they do now. The total area of the phumdi will increase and its extent would be retained at a contour of 2525 feet msl which is achieved today only during the monsoon and post-monsoon period. On the face of it, therefore, it would appear that maintenance of the water at a given level would prevent further decrease of the sangai habitat and make poaching more difficult. Indeed, it may even be that the habitat of the sangai would be increased with the constant water level at 2525' above msl. However, certain factors will have to be kept in mind. The Logtak Lake and the Keibul Lamjao with which it is connected, are a very complex aquatic eco-system. The disturbance of its ecology may have other complex and unforeseen results. The project is almost nearing completion and it will not be possible and advisable to stop it. But a research be carried out on the ecological aspects of this project, indeed on the ecology of the entire Keibul Lamjao-Logtak complex. If any factor which proves to be adverse to either of the two, the project should be modified to that extent. Perhaps the lowering of the water table from 2525' above msl, if such is proved to be necessary may have to be carried out. Certain other considerations may also have to be investigated. Now that the annual flooding and the lowering of the water table in the summer would not be permitted, what would be the ecological repercussions? The phumdi which settles on the hard ground in the dry season would not now be permitted to do so. Would this have any effect upon its composition, and would the phumdi continue to flourish if it is not allowed to settle on the hard ground? In other words,



Above: View from the Channel of Pabot Hill. *Below:* West view from Pabot Hill.



Above: Deer seen from the Helicopter in 1975. *Below:* Captive deer in the enclosure at the Sanctuary.

is the periodic settling of the phumdi on the hard ground essential for its existence? It may be pointed here that phumdi is unique to the Keibul Lamjao, there being very few phumdi islands on the deeper and larger Logtak Lake close by. Moreover, water hyacinth has invaded the Logtak but not the Keibul Lamjao. There is hardly any open water in the latter. But with the water table at 2525' above msl, would there be more open water and as a consequence more water hyacinth? A very significant and interesting factor is that the peak rutting period is in the month of February and March when the water level is at its lowest and the phumdi has settled on the ground, at least on the fringes. The coinciding of the rut with the dry season is not a coincidence in my opinion. And if this assumption is correct, would maintenance of the water table at 2525' above msl adversely affect the rut. Do the animals mate on the floating phumdi or do they require hard ground.

Lastly, the Logtak project envisages the reclamation of the land between contours 2525 and 2528 feet above msl. This is supposed to be an area of 6000 acres. It must be made very sure that the area which is proposed to be reclaimed for cultivation between these two contours, is not from within the Keibul Lamjao Sanctuary.

Recommendations:

Manipur is the only part of India in which the Browantlered deer is found, and it is in fact the only habitat in the world where this particular subspecies occurs. To focus attention on this unique deer, it is suggested that just as Assam has declared the Rhino as the state emblem, the Manipur Government should declare the 'Sangai' as its state emblem.

2. The Keibul Lamjao Sanctuary should be declared a reserve forest and a National Park. This would not only give the State Forest Department adequate power to conserve this unique habitat, but will also set aside this small piece of territory as an area of national importance in which the State and Central governments could work in harmony to achieve a common goal.

3. An adequate wildlife legislation should be adopted. The Government of India has already approached the Government of Manipur for the adoption of the Central Wildlife Conservation and Management Bill. It is hoped that the Manipur Government will adopt this. The existing manual of "Preservation of Wildlife and Reserve Forest and other parts of Manipur" also needs to be revised.

4. The present staff of the sanctuary is totally inadequate. The following personnel is recommended for the sanctuary. One full time A.C.F., one ranger, 6 foresters, 10 forest guards, three boatmen and three game chaprasis. The A.C.F. with two foresters, two forest guards, one boatman and two game chaprasis, should be at Keibul. The ranger, with one

forester, two forest guards and one boatman, should be at Komla-Khong-north-east of the sanctuary. At Ithai one forester, two forest guards and one boatman be stationed, and at Khordak village one forester, two forest guards and one chaprasi. This staff is absolutely essential to prevent poaching and illicit grazing.

5. *Service rifles*—410 muskets or .303 rifles for which cartridges are only available with the Government and not in the open market needs to be supplied to the Ranger and each of the Forest Guards. The Police Department of the State should make available these weapons, as has been done in some other States.

6. The poaching is done mostly with the help of dogs, and traps, and is usually from the north-east of the sanctuary. This will have to be effectively curbed and the poachers prosecuted. Poaching is most prominent in the dry season and if during this time additional staff is required, they could be provided on a temporary basis, to augment the permanent staff. This would be over and above the staff suggested above. The Forest Department should keep a copy of the license holders on the periphery of the sanctuary, and if anything adverse comes to notice, they could move the Government for the cancellation of the licenses.

7. The incidence of grazing is most from November to May. This must be stopped, specially in the northern region around the Chingjao Hill and to the south near Ithai village. As the grazing is mostly from the western, northern and southern sides, a trench could be dug from Thanga Hills to Ithai village to prevent the ingress of cattle. Not only do the cattle constitute a factor of disturbance but also pose a threat as the carriers of disease. One single epidemic is sufficient to wipe out the total world population of the Manipur stag today. Besides, as has been pointed out above, cattle is the main competitor with the Sangai for the grass Ishing Kombong which constitutes less than 10 per cent of the total grass in the sanctuary.

8. Other factors of human exploitation such as fishing, wood cutting on the hills, grass cutting and transit through the sanctuary, should be totally prohibited. Grass cutting only fetches Rs. 2000/- a year and this must be stopped.

9. No person should be allowed to enter the sanctuary without a valid permit from an official not below the rank of a Ranger.

10. Burning of grass should not be allowed in the sanctuary.

11. Illicit cultivation in the Thang-Brel-Maril should be done away with. If this is not implemented the sanctuary is in danger of being cut into two halves with disastrous results. Illegal settlements on the Khordak river must also be removed.

12. Prophylactic inoculation of peripheral cattle and buffaloes, specially the latter, be carried out intensively. In Pabot Hill it may be worthwhile to experiment by placing rock-salt. I am sure the deer would wel-

come this and apart from providing them with nutrition, it would also result in their being seen more frequently from this observation post.

13. No exotic plants or trees should be introduced or planted in the island or elsewhere in the sanctuary. However, the planting of indigenous trees should be carried out on the Chingjao Hill and to a lesser extent on Toya Hill.

14. A wooden observation tower should be put up at Toya Hill with a canal cut through the phumdi from the west. However, this should only be done when effective protection can be provided to this spot.

15. The A.C.F. to be placed in charge of the sanctuary should receive wildlife training at Dehradun.

16. Since the Keibul Lamjao and the Logtak lake are areas of inland drainage and being a complex aquatic eco-system, are extremely fragile, care should be taken to prevent any action which may endanger the eco-systems. Spraying of insecticides and pesticides which will immediately find their way into the lakes, should be prohibited at all cost, otherwise the entire life including the fish, may be jeopardised.

17. A detailed scientific study of the effects of the Logtak project on the Keibul Lamjao, needs to be started forthwith. The salient features of the investigation have been suggested before in this report. In fact there is urgent need to carry out a research on the ecology of the Keibul Lamjao; on its unique phumdi habitat, the deer and the aquatic life.

18. Since the Keibul Lamjao is today the only habitat of the brow-antlered deer, disease or a radical setback, not to mention the incidence of poaching, could wipe out the entire population of the deer. It is therefore, essential that a second suitable home for this deer should be set up in the valley of Manipur itself. This could be in the Khoidum Lamjao (what now remains of it), or any other suitable habitat in the valley. The Forest Department may make investigations in this regard—where a second sanctuary could be created wherein a small breeding group of the sangai could be released at a later juncture.

However, to augment the present low population of the deer in the sanctuary, to enable research on the deer in at least a semi-captive stage, and to provide an added attraction to visitors, a captive breeding programme of the brow-antlered deer on its own habitat, is imperative. At present there is an enclosure which is behind the Keibul forest office in which a hind is kept. Though this is a fairly large enclosure, there is no phumdi nor marsh in it. An ideal enclosure would be one in which a part of the phumdi is enclosed as well, as a certain portion of the hillside to which the animal could move over when they wish to be on hard ground. Such an enclosure could be situated on the Ching-mei Hill southeast of the Keibul forest beat-office. Here the hind held in captivity could be released, and a herd of two stags and three hinds